Operations Management Services

2015 Annual Report

Northport Wastewater Treatment Plant

Contents

Exhibits

Project Description

The Northport wastewater treatment plant (WWTP) is a 0.132 million gallons per day (mgd) plant that treats an annual average of 0.06 mgd of wastewater. The wastewater is collected in the system by gravity sewer and low pressure force mains. Two lift stations help push the water along to the Main Street pump station. From the Main Street pump station, water is pumped to the WWTP. When the wastewater reaches the treatment facility, the water gravity flows through the treatment processes starting at the fine screen unit. After the fine screens, the waste stream flows to the primary anoxic basin and moving bed biological reactor (MBBR). After the MBBR, the water flows to the settling basin where solids are allowed to settle and are then pumped to the solids basin. The settling basin effluent then flows through the polishing filters before final dosage into the rapid infiltration beds.

2015 Project Overview

CH2M has been operating and maintaining the Northport/Leelanau Township Utilities Authority (NLTUA) WWTP, three lift stations, and collection system including residential grinder pumps since 2008. The WWTP has undergone upgrades to increase treatment efficiency, decrease vulnerabilities, and reduce likelihood of emergency calls. We are pleased to present the following operations and maintenance (O&M) year in review.

Innovations and Improvements

- Oversaw the supervisory control and data acquisition (SCADA) upgrade, allowing our team to monitor the system from remote locations and reduce our need to respond to non-critical alarm calls.
- In February, there were four frozen residential grinder systems. One was a seasonal homeowner that left for the winter and one was a residence that we were able to thaw the sewer connection at the main sewer line. The remaining two residences were on Vincer Way. We were able to set up a bypass to a neighbor's grinder system until May when the systems finally thawed. This innovation saved the Northport project thousands of dollars by eliminating the need for daily pumping by a septage hauler, and equipped the facility with the supplies needed to respond to similar future freezing events.
- Cold temperatures often lead to freezing of the sand filters compressed air line which results in a callout. To address this vulnerability, we set up a temporary air hose, a warm backup air hose, and a three-way shutoff manifold that will allow for a fast and easy setup if the permanent air line should freeze. This operational strategy has resulted in a reduction of callout hours related to the compressed air line freezing.
- Rebuilt the discharge piping at 13442 Paradesia Road. The discharge piping needed to be replaced due to stop float failure and subsequent running of the grinder pump that heated and warped the discharge piping until failure.
- Contracted Top Line Electrical to reprogram the recycle pumps to automatically restart after a power blip or outage reducing the number of callouts to the facility.
- Refurbished the fine screen's booster pump, and upgraded to the latest version of software for $250. The new controller and updated software have enhanced the operation of the booster pump resulting in increased water pressure at the fine screens spray bars.

Innovated thinking by the team saved thousands of dollars by creating a bypass to a neighbor's grinder system on Vincer Way.

Repair work on discharge piping on Paradesia Road.

Operational Highlights

- Replaced the lift station controller at Northport Point with a controller from our critical spare parts inventory and rebuilt the faulty controller for inventory. This particular controller is also used at the 7th Street and Main Street lift stations. Having a spare reduces our vulnerability at all three locations. In addition, we found a vendor that rebuilt the faulty controller, avoiding the purchase of a new one and resulting in an approximate savings of $1,500.
- Replaced the battery in the SolarBee mixer on the solids basin.
- After writing, submitting, and having the Michigan Department of Environmental Quality (MDEQ) approve the Residual Management Plan, we coordinated the biosolids regulatory sampling and oversaw the facility's first biosolids haul. Two hundred and twenty-four thousand gallons of biosolids were removed from the solids basin and land applied.
- Performed inspections at each of the end of line manholes, junction and intersection manholes, and any manholes where the force main dumps into the gravity main. We made recommendations pertaining to what portion of the sewer lines needed to be cleaned, and were onsite for the cleaning to ensure proper flow to the Main Street lift station was restored.
- Worked with MDEQ regulators through the National Pollutant Discharge Elimination System (NPDES) permit renewal process. When the new permit was issued, we began to address new requirements in a timely manner.

Biosolids basin.

224

thousand gallons of biosolids removed

2015 Project Overview

Plant Performance

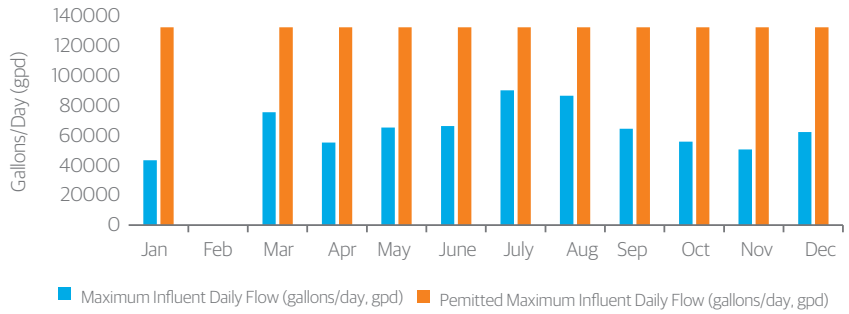
The NLTUA WWTP operates under a NPDES Permit issued and regulated by the MDEQ. The facility was in full compliance with its permit in 2015. The following is a summary of the facility's performance in comparison to the requirements of its permit.

Maximum Daily Influent Flow

The facility is permitted to receive a maximum influent daily flow of 132,000 gallons per day (gpd). As depicted below, the month with the highest maximum daily influent flow was in July when influent flows were at 68 percent of the facility's permitted maximum flow.

Exhibit 1

Maximum Daily Influent Flow

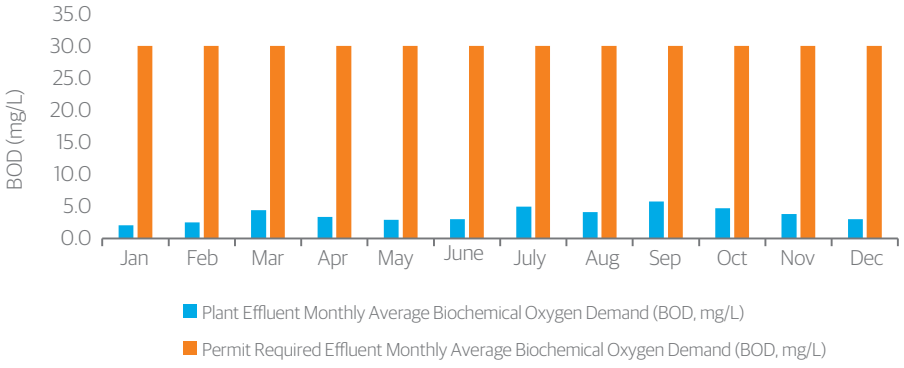


Monthly Average Biochemical Oxygen Demand

Biochemical Oxygen Demand (BOD) is a measure of the amount of oxygen that will be consumed in the receiving waters by the effluent the facility discharges. The permitted effluent monthly average for the NLTUA WWTP is 30 milligrams per liter (mg/L). Exhibit 2 depicts the actual monthly average effluent BOD concentrations in comparison to the permitted limit.

Exhibit 2

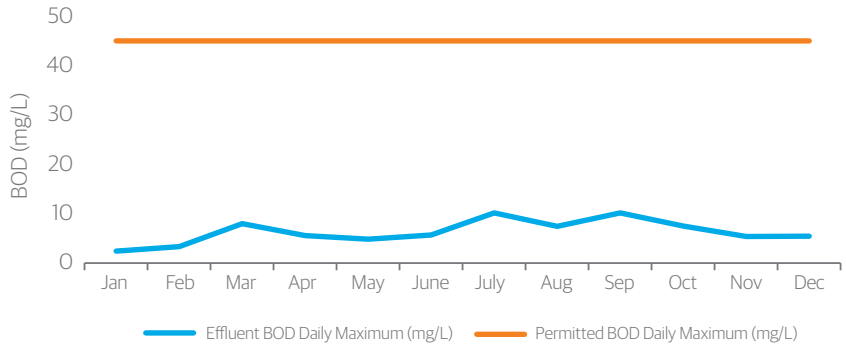
Average Monthly Effluent BOD Concentrations



The daily maximum limit for the NLTUA WWTP effluent BOD concentration is 45 mg/L. Exhibit 3 is a comparison of the daily maximum effluent BOD concentrations versus the permitted maximum daily BOD concentrations.

Exhibit 3

Daily Maximum Effluent BOD versus Permitted Maximum Daily BOD Concentrations



Effluent pH

The pH of the effluent is an indication of the intensity of its acidity or alkalinity. A low pH indicates acidity, and a high pH indicates alkalinity. Effluent pH is monitored and regulated to ensure minimal impact on the receiving waters and/or soil it is discharge to. The pH of the NLTUA effluent ranged from 6.96 to 7.82 in 2015. This range is well within the permitted pH range of 6.5-9.0. (Refer to Exhibits 4 and 5.)

Exhibit 4

Effluent Maximum pH versus Permitted Maximum pH

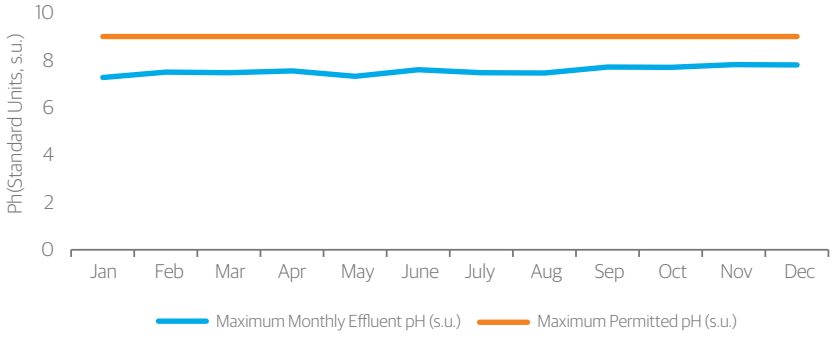
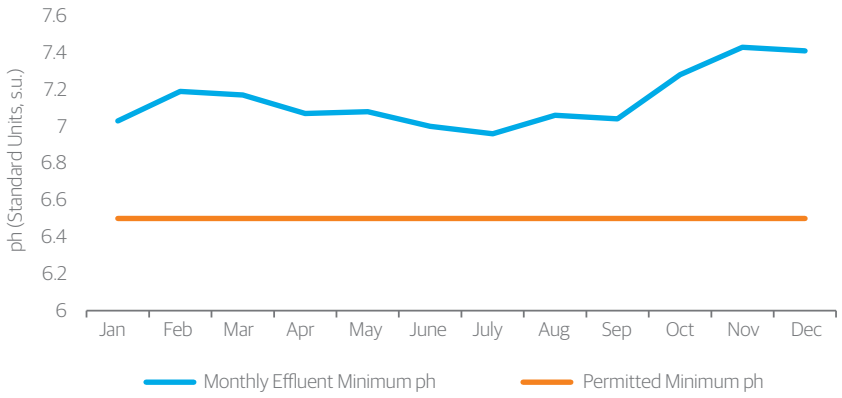


Exhibit 5

Effluent Minimum pH versus Permitted Minimum pH



2015 Project Overview

Total Phosphorus

Phosphorus is a nutrient that aids in the growth of microorganisms and plant life, however, if present in the effluent discharged from the facility in too high of concentrations, it could lead to algae blooms, plant overgrowth, and decreased dissolved oxygen concentrations in the receiving waters and/or soil. Exhibit 6 and 7 compare the effluent total phosphorus concentrations to the permitted total phosphorus concentrations.

In addition to the parameters discussed above, we monitor and report Dissolved Oxygen, Ammonia Nitrogen, Nitrate Nitrogen, Nitrite Nitrogen, Total Inorganic Nitrogen, Chloride and Sodium concentrations in the effluent. The permit contains no limits for these parameters.

Exhibit 6

Effluent Total Phosphorus versus Permitted Total Phosphorus

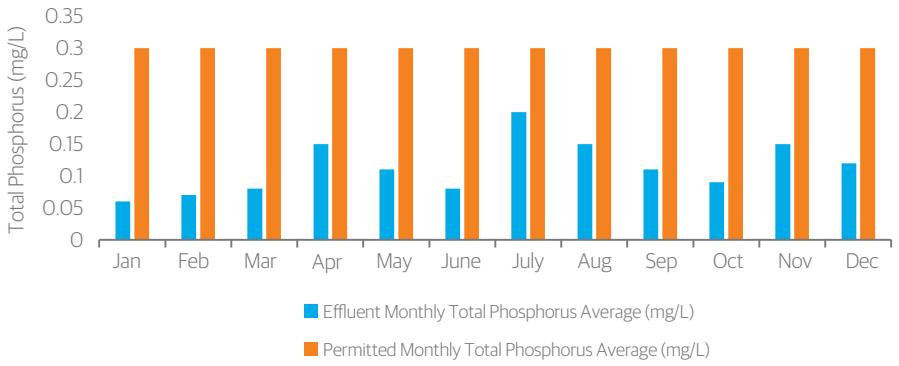
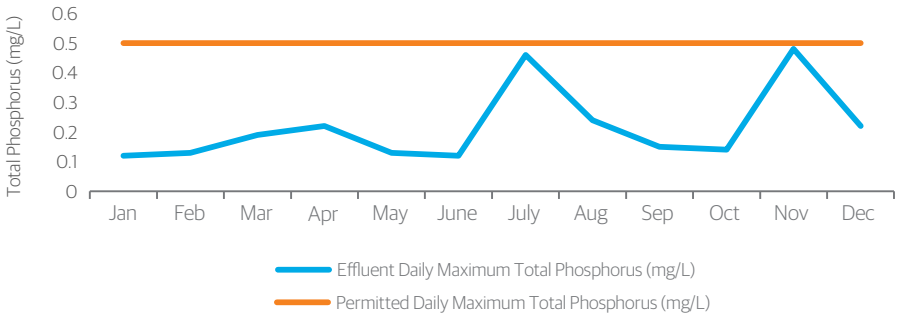


Exhibit 7

Effluent Total Phosphorus Concentration versus Permitted Total Phosphorus Concentrations



Monitoring Wells

On a quarterly basis, the permit requires that monitoring wells up gradient and down gradient of the facility's effluent discharge are sampled and monitored for various parameters. The pH values of the samples taken at the down gradient monitor wells are the only monitoring well parameters with regulated limits. Exhibit 8 and 9 compare the permitted maximum, and minimum pH values, with the actual maximum and minimum pH values from each down gradient monitoring well in 2015.

Exhibit 8

Well Maximum pH Values versus Permitted Maximum pH Values

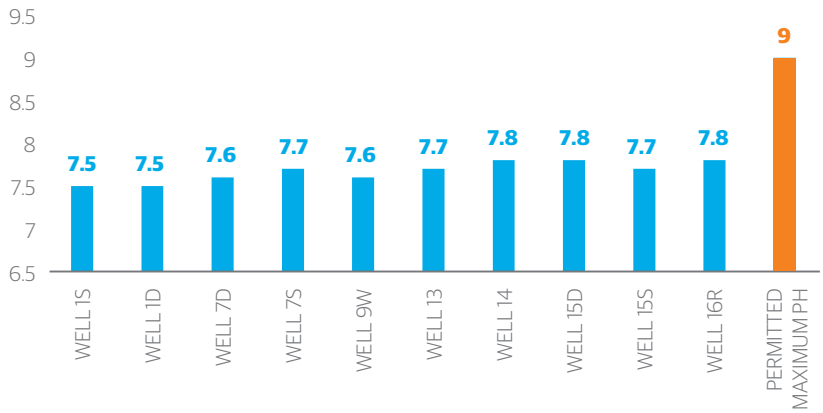
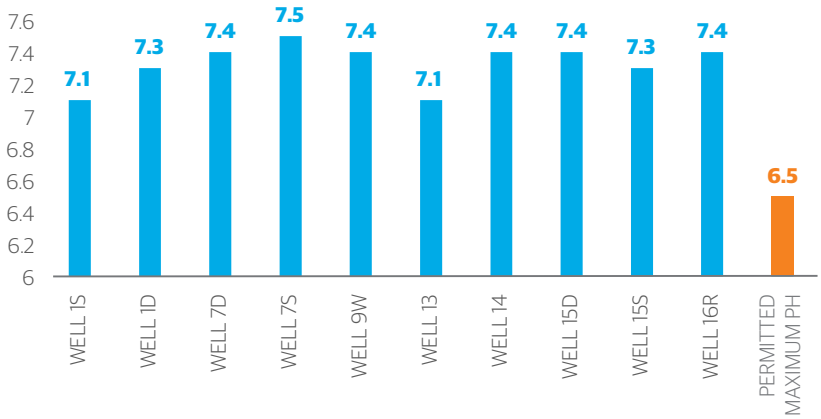


Exhibit 9

Well Minimum pH Values versus Permitted Minimum pH Values



Financial Summary

General Overview

In 2015, our contract was amended to include 300 repair labor hours rather than the previous 200 hours. In 2014, CH2M accumulated 397.2 repair labor hours amounting to 197.2 hours or $11,500 to be included in your annual reconciliation invoice. In 2015, CH2M accumulated 353.2 repair labor hours amounting to 53.2 hours or $2,790 to be included in your annual reconciliation invoice. Exhibit 10 is a general comparison of your 2014 and 2015 repair expenses, repair labor expenses, and direct costs.

Exhibit 10
Repair Expenses, Repair Labor Expenses, and Direct Costs Comparison

Expense Category	2014	2015	2014 Reconciliation	2015 Reconciliation
Direct cost (including repairs labor limit)	$111,205.49	$95,143.41		
Direct cost over limit (including repairs labor limit) – 50% invoiceable	$13,790.49	NA	$6,895.24	
Direct cost under limit (including repairs labor limit) – 50% refundable	NA	$6,817.59		-$3,408.81
Repairs equipment – 100% invoiceable	$11,478.72	$11,644.23	$3,478.72	$3,644.23
Repairs labor over limit – 100% invoiceable	$11,500.00	$2,790.00	$11,500.00	$2,790.00
Reconciliation invoice total			**$21,873.96**	**$3,025.42**
Base fee (includes direct cost and margin)			**$137,936.00**	**$145,451**
Total cost			**$159,809.96**	**$148,476.42**
Total cost difference				**-$11,332.58**

Repairs Budget

Included in CH2M's monthly O&M invoice is an annual repairs limit of $8,000. In 2015, expenses related to repairs at the plant, in the collection system, and of residential grinder systems amounted to $11,644.23. Exhibit 11 summarizes repair expenses equal to or greater than $200. Exhibit 12 illustrates the overall portion of the repair expenses resulting from plant repairs, collection system repairs, and residential grinder pump repairs.

Repairs Labor

Total repair hours for 2015 amounted to 353.2 hours, 53.2 hours over the repairs labor limit. A majority of the time was spent on residential grinder pump repairs needed as a result of freezing lines (Exhibit 13).

Exhibit 11
Repair Expenses More Than $200

Plant Repairs	**Expense**
Investigate and repair kaeser blower No. 2	$4,814.34
Inspect and repair heat trace system on huber fine screen unit, heat cable, and seal kit	$288.63
Fittings to hook up a second air line to the sand filters	$279.16
Fine screen booster pump repair and reprogramming	$331.90
Programming of recycle pumps to auto restart after power outage	$570.00
Pumping and cleaning of reject chamber	$225.00
Two replacement check valves for reject chamber	$240.06
Collection System Repairs	**Expense**
Critical spare parts for NLTUA lift stations	$743.54
Northport PT controller repair and programming	$294.83
Residential Grinder System Repairs	**Expense**
Lay flat hose for 452 Vincer Way pump around	$558.73
Floats	$231.86
Repair/replacement of various grinder pumps	$1,895.66

Exhibit 12
2015 Repair Expenses

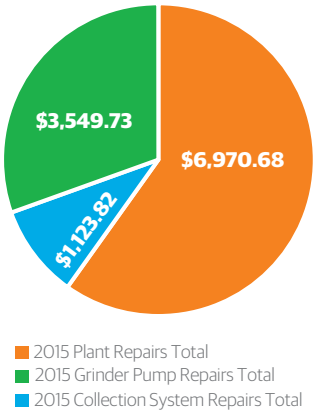
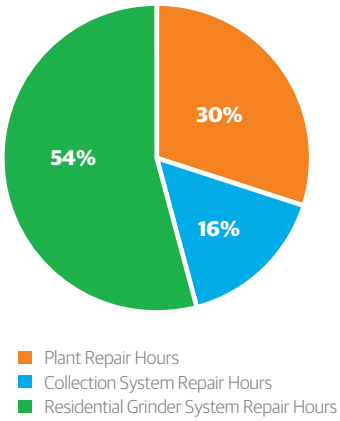


Exhibit 13
2015 Repair Labor Hours



Project Staff

The Northport Project Manager is Elizabeth Hart. She is supported by a staff of 15 technical and non-technical employees. Employee changes in the past 12 months include Marcus Evans becoming the Satellite Projects Supervisor and Andrew Waldron replacing Scott Zenner as the Maintenance Supervisor.

Northport WWTP on-call personnel include:

- Nathan Callison
- Kerry Gensler
- Andrew Waldron
- Shane Wyatt

All employees in the organization chart play a part in serving the Northport project.

Exhibit 15 highlights employee licenses and certifications.

In addition to our onsite employees, the project has support from numerous CH2M regional and corporate personnel including Regional Business Group Manager Andy Appleton, Regional Director of Operations Kirby Chaney, Regional Manager Kevin Dahl, Regional Technical Specialist Maribeth Wintercorn, Maintenance Specialist Steve Hutchings, and Regional Accountants Shelly Campbell and Carolyn Cryer.

Exhibit 14
Organizational Chart

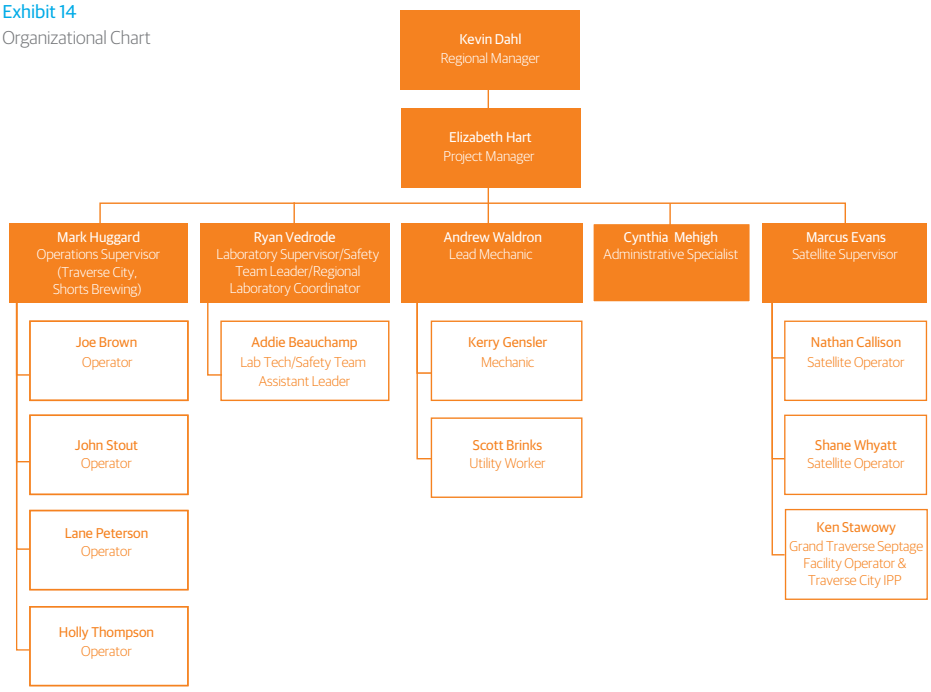


Exhibit 15
Employee Licenses and Certifications

Name	License/Certification
Addie Beauchamp	MDEQ Industrial A-1b, A-2c, B-2a, C-3s, and Wastewater D
Joe Brown	MDEQ Wastewater B, C, and D
Nathan Callison	MDEQ Wastewater C, D
Marcus Evans	MDEQ Wastewater A, B, C, D, and Stormwater
Elizabeth Hart	MDEQ Wastewater W A, B, C, D, L1, L2, Stormwater and Water F-4
Mark Huggard	MDEQ Wastewater A,B,C,D, L2, Water F-4, and S-4
Lane Peterson	MDEQ Wastewater D, Water F-4, and S-4
Ken Stawowy	MDEQ Wastewater A,B,C,D, L1, L2, and Stormwater
John Stout	MDEQ Wastewater B, C, and D
Ryan Vedrode	MDEQ Wastewater A, B, C, D, L1, L2, and Stormwater
Holly Thompson	MDEQ Wastewater D
Shane Wyatt	MDEQ Wastewater L2, L1, Water D-3, and S-3

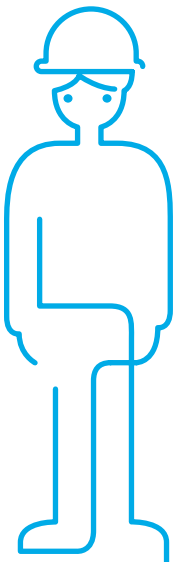
Community Involvement

As members of the community, we continue to provide tours for local residents, MDEQ, community leaders, members of the Michigan Rural Water Association, and many others.

On the Horizon

CH2M's plans for 2016 include:

- Design and install an effluent flow meter. The flow meter is required by the MDEQ to be installed by the end of August 2016. We are currently gathering quotes for the flow meter installation.
- The WWTP needs to excavate and repair the recycle line valve. Due to the cost of excavation ($9,000, not including repair), we are exploring alternative solutions. In the meantime, we have adopted a plan to abandon the recycle valve and use other more accessible valves for recycle flow. In addition, the sludge valve may fail in the future. One option is to install an alternate PVC valve on the sludge line in the settling basin. We will continue to explore this option and find the cost to fix this valve.
- The fine screen auger needs to be pulled and coated with protective epoxy (H2S rated). We also need to change any corroded/compromised brush brackets, nuts, or bolts.
- Clean settling basin and possibly influent equalization basin in Spring 2016.
- Compressors are nearing the end of their life. We recommend replacing with a different type of compressor, one that runs at a much lower revolution per minute and is more suited for this application. This type of compressor will provide a much longer life span.



Conclusion

CH2M remains committed to providing the same level and expectation of service we have provided NLTUA for the past 7 years. We will continue to manage, operate, and maintain the treatment plant and collection system in the best interest of the NLTUA, as outlined in the contract. We will continue to monitor process performance and look for ways to reduce energy consumption for the betterment of the community. CH2M looks forward to working with the NLTUA for many years to come.

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